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State Water Planning: Theory v. Practice in Texas

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STATE WATER PLANNING: THEORY V. PRACTICE IN TEXAS

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I. SUMMARY

The current Texas water planning process, which was initiated in 1997, relies on a "bottom-up" approach: sixteen regional water planning groups ("RWPGs") develop water supply and demand projections that are then compiled into a "state plan" by the Texas Water Development Board ("TWDB"). The projections are made for a 50-year period for all types of water uses and based on drought-of-record rainfall conditions. The plan is reviewed and revised every five years.[1]

The bottom-line figures from the plan drive tend to drive state discussions of the need to fund new water infrastructure. The most current plan projects a 50-year need of $53 billion to supply 8.3 million acre feet of additional water by 2060, which make for scary headlines indeed.

This essay discusses whether the Texas water planning process really *does* produce the kind of reliable demand and cost projections that should be driving state funding and water policy debates. It examines issues such as the built-in incentives for regional water planning groups, the appropriate role for state review of regional plans, the focus on a 50-year timeline, and the disconnect between water planning and critical policy issues, such as groundwater management and protection of healthy flows.

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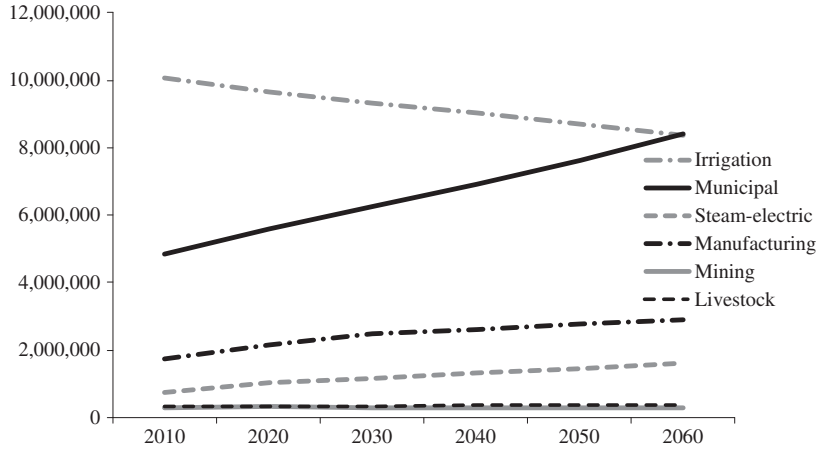
1. WATER FOR TEXAS 2012 STATE WATER PLAN, TEX. WATER DEV. BD. (2012), http://www.twdb.state.tx.us/publications/state_water_plan/2012/2012_SWP.pdf; *see also* Tom Gooch et al, *Building From Regional to Statewide Water Planning*, THE TEX. APPROACH TO WATER PLANNING (2010), http://ussdams.com/proceedings/2010Proc/977-994.pdf.

The essay shows that while the Texas water planning process is valuable and important, its execution in practice is often flawed, resulting in over-estimates of the gap between projected demand and supply; new supply costs; lost opportunities for resolving real near-term needs through cost-effective solutions; and a limited ability to deal with critical policy issues that will have significant effect on the state's ability to sustainably manage its water resources for future generations.

II. Texas Water Plan Projections

The 2012 Texas Water Plan projects that the state will need 8.3 million acre feet of additional water by the year 2060.[2] Most of the increase is projected for the municipal sector.

Figure 1: Water Demand Projection By Use Category (Acre Feet Per Year).[3]



The current plan projects a steady increase in municipal use (from 4.85 million acre feet in 2010 to 8.41 million acre feet in 2060). This increase is tied directly to projected population growth. Irrigation use is projected to decline by over 1 million acre feet/year by 2060 from the current level of 10 million acre feet/year.

In order to supply this projected new demand, the plan proposes over 500 different water supply "strategies," from conservation to construction of over twenty-six new reservoirs (for a projected 1.5 million acre feet/year) and several major long-distance pipelines. The plan projects a capital cost of $53 billion to implement all of the strategies.[4]

2. *See generally* Water for Texas 2012 State Water Plan, *supra* note 2.

3. 2012 Water for Texas, Ch. 3: Population and water demand projection at 137, Tex. Water Dev. Bd. (2012), http://www.twdb.state.tx.us/publications/state_water_plan/2012/2012_SWP.pdf.

4. *Id.*

FIGURE 2: RELATIVE VALUES OF RECOMMENDED WATER MANAGEMENT STRATEGIES IN 2060.[5]

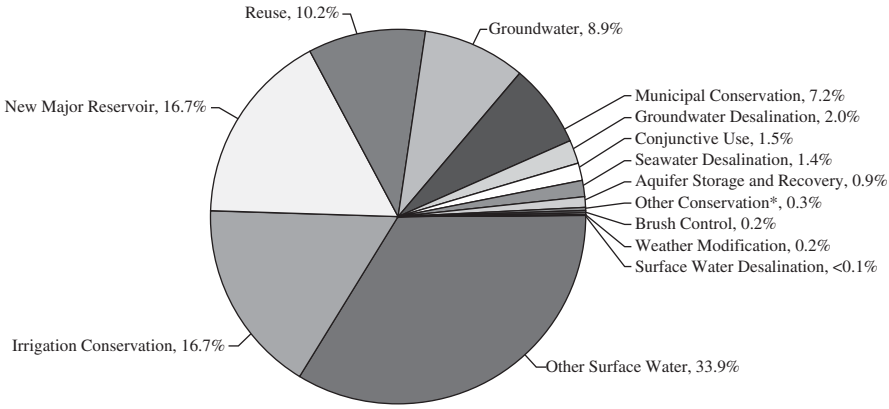
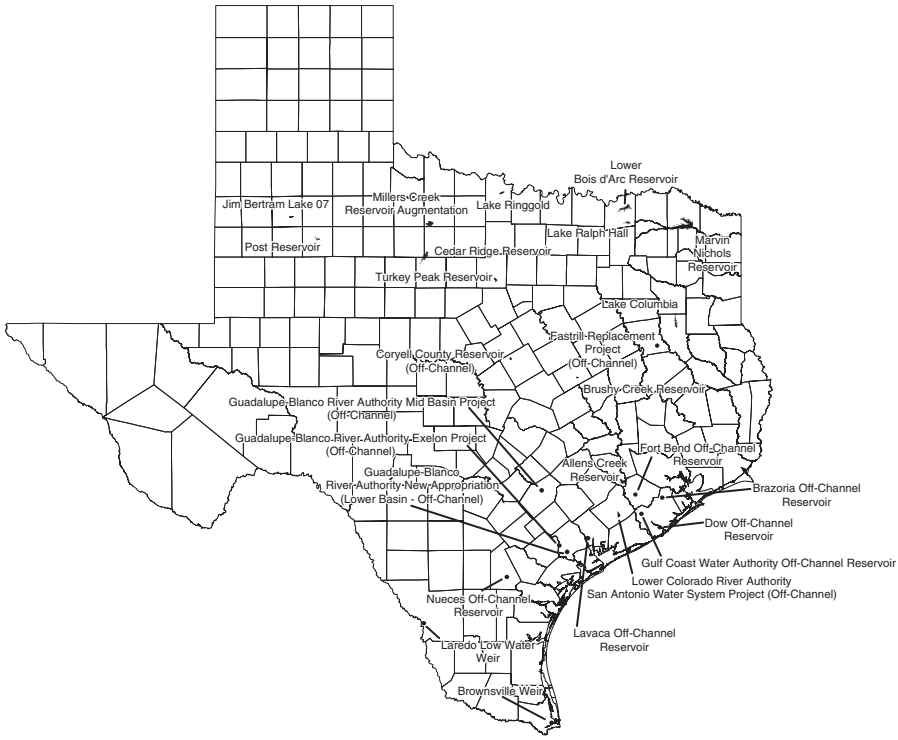


FIGURE 3: RECOMMENDED NEW MAJOR RESERVOIRS.[6]



5. 2012 WATER FOR TEXAS, CH. 7: WATER MANAGEMENT STRATEGIES at 191, TEX. WATER DEV. BD. (2012), http://www.twdb.state.tx.us/publications/state_water_plan/2012/2012_SWP.pdf.

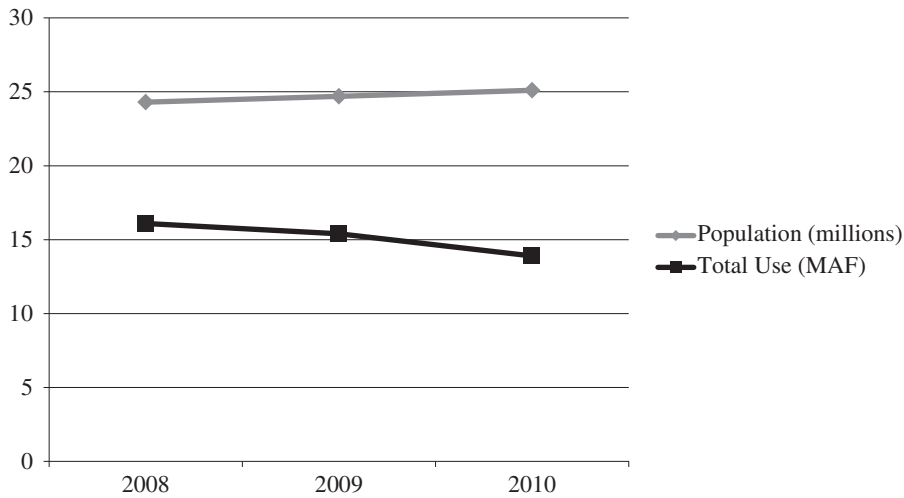
6. *Id.*

Most of the projected new demand and capital costs would be located in the Dallas/Fort Worth area (Region C), the Houston-Galveston area (Region H) and Central Texas (Region L). In fact, these three regions account for over three quarters of the proposed $53 billion in new supply projects, with the remaining one-quarter split almost equally between the other thirteen regions. The twenty most expensive projects proposed in the 2012 plan, eleven of which are in Region C, account for 51% of the total projected $53 billion cost of the plan. Region C alone accounts for 40% of the projected cost of the plan, but only about a quarter of the state's population.[7]

III. Comparison of Projections to Recent Trends in Actual Use

One way to evaluate the reliability of the state water plan projections is to compare them to recent and historical trends.

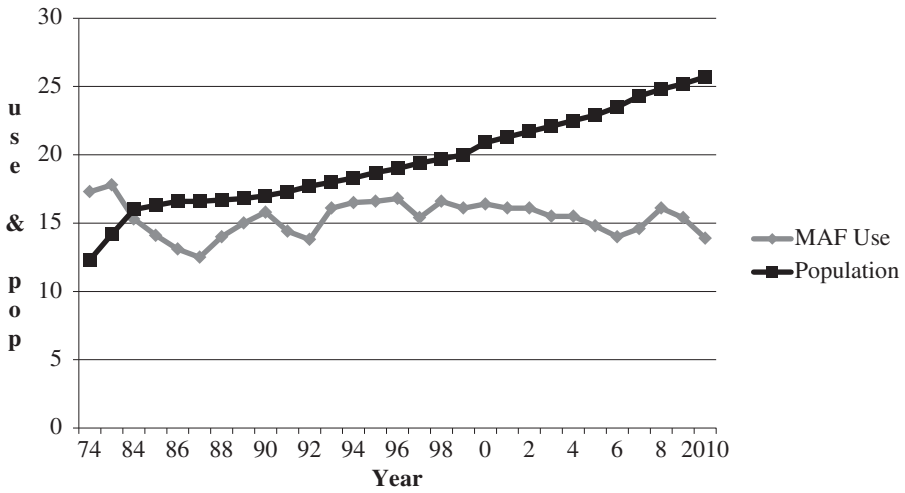
Figure 4: Actual Water Use (million acre feet) v. Population (millions)[8]



7. *See id.* at 212–13.

8. Texas Water Development Board, TWBD, http://www.twdb.state.tx.us/waterplanning/waterusesurvey/estimates/.

FIGURE 5: HISTORICAL TOTAL TEXAS STATEWIDE WATER USE (MILLION ACRE FEET)[9]



Figures 4 and 5 show that, contrary to the state water plan projections, municipal use has essentially been flat for the last three years, while total use has declined slightly even as population has increased. These last three years are unlikely to be an aberration. Figure 5 shows that total water use in Texas, while varying from year to year, has not mirrored the increase in population.

Declines in irrigation are balancing some municipal increases, but, overall, Figure 5 shows that efficiency practices may also be starting to take hold, changing underlying demand patterns.

Similar use trends are shown all over the country, including the western U.S. For example, a December 2012 report by CERES finds a "pervasive trend of declining municipal water demand across the U.S."[10] This mirrors earlier analysis by the U.S. Geological Survey and others.[11]

Inaccuracy in demand projections is important. Not only can it present a false picture of the scope of the needed actions (and drive supply "solutions" towards big, expensive projects); but, as the CERES report notes, if new supply projects are built and demand fails to materialize, water providers may run into trouble with downgrading of their credit ratings.

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9. Texas Water Development Board, TWBD, http://www.twdb.state.tx.us/waterplanning/waterusesurvey/estimates/.

10. Sharlene Leurig, *Water Ripples: Expanding Risks for U.S. Water Providers*, CERES 11–14 (Dec. 2012), http://www.ceres.org/resources/reports/water-ripples-expanding-risks-for-u.s.-water-providers.

11. *See, e.g.*, *Trends in Water Use in The United States*, USGS (Jan. 10, 2013, 10:00 AM), http://ga.water.usgs.gov/edu/wateruse-trends.html.

IV. Incentives to Inflate the Gap Between Demand and Supply

Region C (Dallas/Fort Worth) accounts for almost one-third of the projected municipal water demand increase by 2060. Digging into the details of the plan, one finds that many cities in the Dallas/Fort Worth area project that per capita demand in 2060 will be the same as present per capita demand (well over 200 gallons per capita per day). Regional planners then included supply projects that would meet 122% of projected demand. Not surprisingly, Region C accounts for 40% of the projected cost of the state plan, far more than its share of state population (25%).

There are several factors that may serve to drive what appear to be substantially inflated water demand projections. First, Texas law requires that to receive a permit from the Texas Commission on Environmental Quality, a project must be "included" in the plan. Thus, if entities have ideas about different projects they *might* want to do in the future, even in 2060, the incentive is to ensure that projected gap between demand and supply will justify inclusion of that project in the plan.

Second, the planning process is based on water use in drought of record, which can result in substantially increased projected demand. In fact, the Region C plan states that "[*d*]*ry year demands are significantly higher than normal year demands, especially for municipal use (because of increased lawn irrigation use). Normal-year demands in Region C might be 10 to 15 percent lower than dry year demands*."[12]

Dry year demands could be reduced through the application of drought management measures, such as watering restrictions or other measures. This could be reflected in either adjustments to projected demand or inclusion of drought management as a water supply strategy.

A 2009 report prepared for the TWDB discussed the barriers (real and perceived) to including reasonable drought management measures as a demand side management strategy in the regional water plans.[13] The report found that:

> [t]he most common reasons for opposing the use of drought management measures as a water management strategy were the removal of the *safety factor* provided by drought management plans, potential economic impacts and the unwillingness of water providers and the public to accept a planning approach that includes future shortages and demand reduction measures. Proponents, on the

12. *Region C Water Planning Group*, 11 Region C Water Plan at ES5 (Oct. 2010), http:// www. regioncwater . org / Documents / 2011RegionCWaterPlan / EXECUTIVE_SUMMARY_Final.pdf.

13. *Drought Management in the Texas Regional and State Water Planning Process*, BBC Research & Consulting (May 31, 2009), https://www.twdb.state.tx.us/publications/reports/contracted_reports/doc/0804830819_DroughtMgmt.pdf.

> other hand, argue that during periods of drought most providers would implement drought measures, and not including effects from these measures in the planning process could lead to unnecessary water projects [being proposed].[14]

Clearly, the current Texas drought has shown that demand reduction measures are gaining more traction and are often the most cost-effective response, thus increasing public support for this approach.

The researchers also found that RWPGs were not including drought management measures because the lack of information on water supplies under varying hydrological conditions promoted a more "cautious" approach to water planning and that, in many regions, "relatively affordable new supply alternatives remain."[15] But, with the more persistent drought evident over the last few years and higher construction and energy cost estimates for many of the big new infrastructure projects, drought management could be a much more important component in many regions.

Third, while the regional water planning groups are made up of various stakeholders (including water providers, water users, recreation and environmental interests), much of the work of actually developing the details of the plan falls to the consultants hired by the RWPGs. These consultants are often traditional engineering firms, which have historically focused on "hard infrastructure" supply options such as new reservoirs and long-distance pipeline projects. Often, due to economies of scale,[16] a larger projected gap between demand and supply is needed to justify these bigger, more expensive projects.

While things have improved in the last decade of Texas water planning with respect to including improved efficiency as a strategy to reduce projected new demand, more remains to be done to ensure that drought management and efficiency measures are being given the greatest degree of consideration possible.

V. Role of the State

Given these factors, it might seem that a substantive review by the state, through the TWDB, for example, might be helpful to ensure that the plan is based on realistic demand projections. However, the process does not currently work that way. Instead, the TWDB provides the regions with population projections and initial projected dry-year demand (adjusted for appliance water efficiency measures re-

14. *Id.* at ES 1–2 (emphasis added).

15. *Id.* at ES2.

16. That is, the more water demand proposed to be supplied by a big infrastructure project, the lower the projected cost per acre foot. Without a substantial demand projection, some big reservoirs, or long-distance pipeline projects, would likely be economically infeasible.

quired by law).[17] The decisions about what efficiency or drought management measures to apply over the 50-year time period are essentially left solely to the regions.[18]

In reviewing regional plans to compile the state water plan, state law charges the TWDB with providing "guidance" for the regional plan development and resolving any conflicts between regions.[19]

But, it does not charge the Board with a substantive review of the strategies chosen by the regions. Nor does it require, for example, TWDB to compile projected water supply strategy costs in a way that does not include multiple projects that would serve the same projected demand. That is, the total cost of the plan projected now can include two projects that would meet the exact same projected demand, even though both projects would not be built. Moreover, current state law does not clearly require that TWDB independently assess project priorities in a way that identifies which projects are needed to meet real short-term demand, which are most cost-effective, and/or which need state assistance.

As a result, in many policy and media circles the "plan" gets boiled down only to the projected 50-year bottom line: 8.3 million acre feet of additional supply and $53 billion.

VI. Potential Pitfalls in Long-Term Focus

The 1968 State Water Plan (prepared by the state) projected that Texas would need 12 to 13 million acre feet of water from the Mississippi River by 2020.[20] Of course, that massive pipeline project never happened and yet the state thrived.

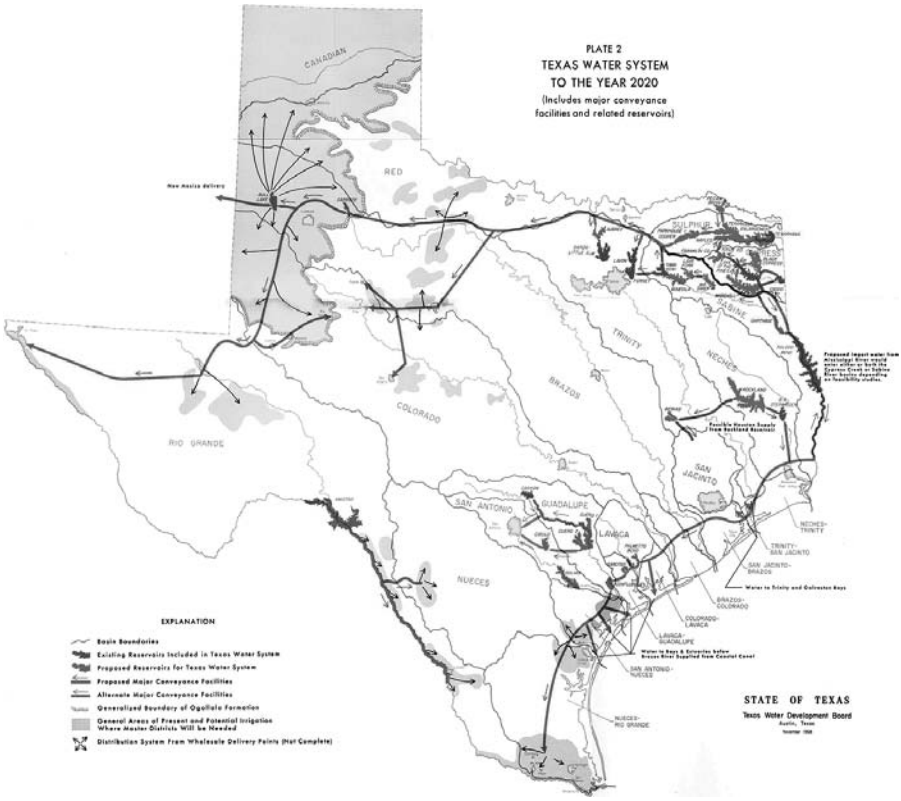
17. Memorandum from Tex. Water Dev. Bd. on Briefing and Discussion on Process for Development and Adoption of Population and Water Demand Projections for the 2016 Regional Water Plans (Mar. 7, 2013, 10:08 PM), http://www.twdb.state.tx.us/board/2013/01/WorkSession/WS04.pdf; *see also Process for Requesting Adjustments to Population and Water Demand Projections*, (Mar. 7, 2013, 10:08 PM), http://www.twdb.state.tx.us/waterplanning/rwp/planningdocu/2016/doc/chairsconfcalls/5-25-2011/att_E_projection_adjust.pdf.

18. Tex. Water Code Ann. § 16.053(h)(7)(B) (West Supp. 2012) (stating that TWDB cannot approve a regional plan unless it concludes that "(B) the plan includes water conservation practices and drought management measures incorporating, at a minimum, the provisions of Sections 11.1271 and 11.1272 [Texas Water Code]." But those sections of the Code just require various entities to have drought management and water conservation plans and does not control their content.).

19. *Id.* at § 16.053(h)(7)(A), (C).

20. *See, e.g.,* Todd H. Votteler, *Water Boondoggles: The Biggest Little Water Plan in Texas*, http://www.edwardsaquifer.net/pdf/waterplan.pdf.

FIGURE 6: PROPOSED RESERVOIRS AND PIPELINES FOR 1968 TEXAS WATER PLAN MISSISSIPPI IMPORTATION PROJECT.[21]



Long-term water projections are difficult and should not be—but often are—viewed as gospel. Many things can change over the course of five decades, with technological innovation, dynamic economies and changing social values.[22]

Yes, some large projects, such as new reservoirs, do take a long time to design and permit. But, with the Texas plan's focus on a 50-year time frame, and few, if any, mechanisms to draw out the shorter-term needs, the state may be losing opportunities to support cost-effective approaches to meeting demand, such as drought management, efficiency improvements, and private land stewardship incentives to boost watershed health and aquifer recharge.

While the State Plan compiled by the TWDB does present supply and demand projections by decade, it does not clearly identify priority projects by decade. Recent discussions of state water plan funding in

21. Texas Water Development Board, TWDB, http://www.twdb.state.tx.us/publications/State_Water_Plan/1968/68SWP_fig2.pdf.

22. *See* Leurig, *Water Ripples: Expanding Risks for U.S. Water Providers, supra* note 11, at 13–14.

the 83rd legislative session have thus all keyed off the state having to eventually finance half of the $53 billion 50-year cost,[23] instead of what the state role should be in ensuring realistic needs in the next two or three decades are met in a cost-effective and sustainable manner.

VII. Lack of Connection with Other Policy Issues

With recent developments on both the groundwater and environmental flows fronts in Texas, there is a need to reexamine how the planning process can be improved to ensure that the state has a complete and integrated view of supply and demand issues.

A. *Groundwater*

Updated every five years, the state plan projects demand for and supply both groundwater and surface water. The regional water planning groups must now use the desired future conditions ("DFCs") developed by the groundwater management areas ("GMAs") as one consideration in the planning process.[24] The DFCs can be used in determining how much groundwater will be available to meet future needs ("modeled available groundwater" or "MAG"). In areas of the state where groundwater pumping may affect surface water flows, the DFCs may also affect the amount of surface water projected to be available for existing and projected new uses.

Unfortunately, the schedules for development of regional and state water plans and new DFCs are disconnected. The current law would result in the following timeframe:

> **March 2015**: Initially prepared plans due from regional water planning groups
> **September 2015**: Planning groups adopt and submit final plans to TWDB
> **September 2015**: New DFCs must be proposed by GMAs
> **Fall 2015**: TWDB reviews regional plans
> **January 2017**: New state water plan due to Legislature

Given the expense and effort involved in updating the regional water plans and the state plan, relying on the existing DFCs, which are likely to change soon, is an inefficient use of time and resources.

If the due date for the next set of regional plans were to be delayed to 2017 (two-year delay), the RWPGs would instead have the oppor-

23. *See Water for Texas 2012 State Water Plan*, *supra* note 2 at ES 6 (The State Water Plan concludes, based on surveys of the regional planners, that the state would have to pick up one-half the projected $53 billion tab for proposed new supply projects.).

24. *See, e.g.*, Carolyn Brittin, *The State Water Plan and Regional Water Planning Group Updates from the Groundwater Perspective*, Tex. Groundwater Summit (Sept. 10, 2012), http://www.slideshare.net/TXGroundwaterSummit/state-water-plan-and-rwpg-updates-from-the-groundwater-perspective-carolyn-brittin.

tunity to use the new DFCs currently being developed. This should result in a much more realistic view of groundwater supply and demand. The revised schedule would be:

> **September 2015**: New DFCs must be proposed
> **March 2017**: Initially prepared plans due from regional water planning groups
> **September 2017**: Planning groups adopt and submit final regional plans to TWDB
> **Fall 2017**: TWDB reviews regional plans
> **January 2019**: New state water plan due to Legislature

A two-year delay in the deadline for the revised state plan does not mean the RWPGs would halt work over the next two years. Instead, they could continue work with the funding already available under current appropriations ($9.1 million).[25] Once the RWPGs receive the new DFCs (in the fall of 2015) they could prepare updated plans. The Legislature could award any additional funds needed by the RWPGs in the 2015 session.

Another groundwater issue is the lack of connection between surface water and groundwater availability models. A 2005 report prepared for the Texas Commission on Environmental Quality found that, based on available data, most large streams in Texas gain, rather than lose, water during low flow conditions.[26] The report concluded that discharge of groundwater from aquifers through seeps and springs provided more than half of river flows throughout most of Texas during dry times.[27] Examples of areas of the state with high groundwater/surface water interconnectivity include the Hill County and Edwards-Trinity Plateau (encompassing the headwaters of the Pecos, Devils, Nueces, Frio, Sabinal, Medina, Guadalupe, Llano, San Saba, Pedernales and Blanco rivers); the lower Brazos River; the lower Colorado River and the Canadian River in Hemphill County.[28]

Despite the evidence of important interconnections, many areas of Texas lack sufficient data and modeling tools to carefully consider such interconnection in planning, permitting and management decisions. In 2007, TWDB staff recommended that the state focus on

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25. Memorandum from Tex. Water Dev. Bd. Staff on Authorizing the Executive Administrator to publish a request for regional water planning grant applications for up to $9.5 million to complete the fourth cycle (2011–2015) of regional water planning (Mar. 7, 2013, 10:08 PM), http://www.twdb.state.tx.us/board/2012/07/Board/Brd24.pdf (awarded $3.6 million to the RWPGs for this next round of planning. It also issued a "request for applications" for an additional $5.5 million in appropriated FY 12–13 funds, to be divided among the different regions according to need and issues).

26. *See generally* B.R. Scanlon, et al., *Groundwater Surface Water Interactions in Texas*, BUREAU OF ECON. GEOLOGY, U. TEX. AT AUSTIN (Aug. 2005).

27. During times of rainfall, surface runoff dominates flows.

28. *See also* Laura B. Marbury and Mary E. Kelly, *Down to the Last Drop*, ENVTL. DEFENSE FUND 3–6, TEXSCIENCE.ORG (Mar. 2009), http://texscience.org/water/rule_capture/Marbury_Kelly_2009_down_to_the_last_drop.pdf (providing more detailed discussion of these interconnectivity hot spots).

three areas of necessary improvement, "measuring streamflow gains and losses; identifying better ways to consider surface water-groundwater interaction in the groundwater availability models; and identifying appropriate ways to connect [surface] water availability and groundwater availability models."[29]

The groundwater availability models ("GAMs") are used to determine the DFCs for groundwater. The surface water availability models ("WAMs") are used in evaluating surface water right permit requests, regional water planning and the Senate Bill 3 environmental flows process. Unfortunately, these models are generally not linked and thus there are substantial uncertainties about the reliability of the models in areas of the state where there is significant interconnection between surface water and groundwater.[30]

As use of both surface and groundwater increases, and with the persistence of drought, there is a much more pressing need to better understand these interconnections and reduce uncertainties in the models used for planning, permitting and management decisions.

B. *Environmental Flows*

Under Senate Bill 3, enacted in 2007, Texas has initiated a process to develop quantified environmental flow standards for each of its major river basins. To date, standards have been enacted for four basins (Sabine/Neches; Trinity/San Jacinto; Colorado/Lavaca; and Guadalupe/San Antonio) and three more basins (Nueces, Brazos and Rio Grande) are scheduled to have rules in place by March 2014.[31]

These standards reflect the flow regime necessary to maintain a sound ecological environment in rivers and bays. The standards and flow requirements are highly relevant to regional water planning. TWDB's rules for regional planning groups do require consideration of adopted environmental flow standards in evaluating environmental water needs and in evaluating proposed water supply strategies.[32] However, current law does not require coordination between the RWPGs and the Senate Bill 3 "Basin and Bay Stakeholder Committees" ("BBASCs"), which have a more diverse stakeholder member-

29. Robert E. Mace, et al., *Surface Water and Groundwater—Together Again?* State Bar of Tex. at 8th Annual Changing Face of Water Rights in Tex. (June 2007), http://www.txessarchive.org/documents/MaceandOthers2020071.pdf; *see also* Marbury & Kelly, *Down to the Last Drop*, *supra* note 22, at 6 (making a number of similar recommendations before the 2009 legislative session).

30. *See* Mace, *Surface Water and Groundwater—Together Again?*, *supra* note 30 (An exception is the Edwards Aquifer area and contribution of flows to the San Marcos and Guadalupe Rivers due to the high level of effort to manage that system in light of federal endangered species restrictions.).

31. *See* ENVIRONMENTAL FLOWS ASSESSMENT, TEX. COMM'N ON ENVTL. QUALITY (Dec. 16, 2009), http://www.tceq.texas.gov/permitting/water_rights/eflows.

32. *See* 31 TEX. ADMIN. CODE § 358.3 (22)–(23) (2012); 31 TEX. ADMIN. CODE § 357.34(d)(3)(B) (2012).

ship and which have spent considerable time evaluating environmental flow needs. The Texas Environmental Flows Science Advisory Committee recently recommended better coordination between the Senate Bill 1 planning process and the Senate Bill 3 environmental flows process.[33]

33. Memorandum from the Tex. Envtl. Flows Sci. Advisory Comm. to the Envtl. Flows Advisory Grp. 4 (Dec. 13, 2012).